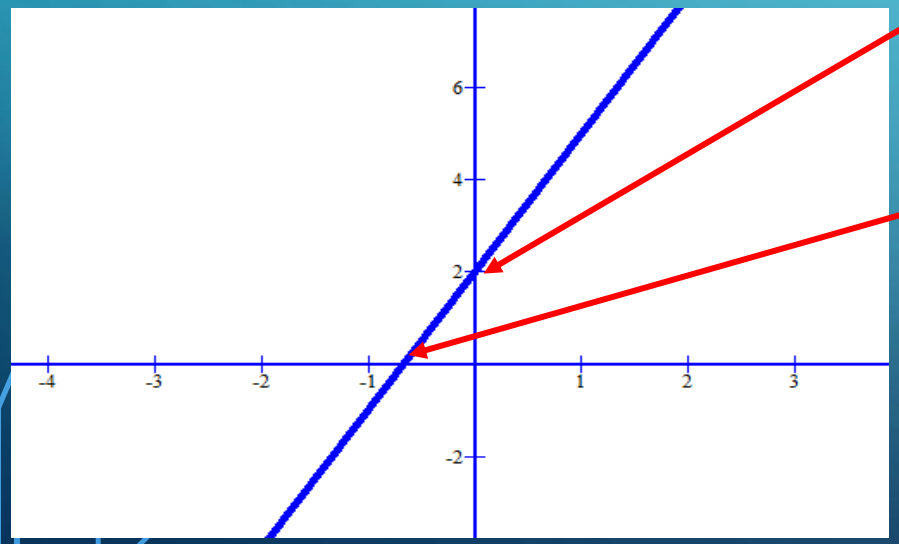
GRADE 12 FUNCTIONS PART 2

INVERSES OF:

- $y = mx + c$

LET US LOOK AT THE FUNCTIONS FIRST BEFORE THE INVERSE OF THE FUNCTIONS

- $y = mx + c$
- **EXAMPLE**
- $y = 3x + 2 \; or \; f(x) = 3x + 2$



Straight Line Graph

Domain

$x \in \mathbb{R}$

Range

$y \in \mathbb{R}$

Y-Intercept (x=0)

(0;2)

X-Intercept (y=0)

$0 = 3x + 2$

$-2 = 3x$

$-\frac{2}{3} = x$

$(-\frac{2}{3}; 0)$

TURNING POINT

None

ASYMPTOTES

None

GRADIENT

3 (Positive)

INCREASING FUNCTION

As x-values get bigger, so do the y-values

LET US NOW LOOK AT THE INVERSE FUNCTION OF THE STRAIGHT LINE GRAPH

IMPORTANT

REPRESENTS a y-value still as f(x) did.

- $f^{-1}(x)$ *is the inverse function notation of the inverse of* $f(x)$
- X BECOMES Y and Y BECOMES X
- THIS MEANS THE FOLLOWING :
  - DOMAIN OF THE FUNCTION BECOMES THE RANGE OF THE INVERSE FUNCTION (and visa versa)
  - THE Y-INTERCEPT OF THE FUNCTION BECOMES X-INTERCEPT (and visa versa)
  - THE LINE OF SYMMETRY BETWEEN THE FUNCTION AND THE INVERSE FUNCTION IS Y=X

THE FUNCTION NEEDS TO BE IN THE FORM OF Y=..... OR $f^{-1}(x) = \cdots$.

LET US NOW LOOK AT THE INVERSE FUNCTION OF THE STRAIGHT LINE GRAPH

LET US LOOK AT AN EXAMPLE TO ILLUSTRATE THE CONCEPT:

$f(x) = 3x + 2$ is the same as $y = 3x + 2$

We use $y = 3x + 2$

1. **X becomes Y and Y becomes X**

$x = 3y + 2$

2. **Change to the form of y = ….**

$x - 2 = 3y$

$\frac{x-2}{3} = y$

$y = \frac{x-2}{3}$

$\therefore f^{-1}(x) = \frac{x-2}{3}$ ← INVERSE FUNCTION

$\therefore f^{-1}(x) = \frac{1}{3}x - \frac{2}{3}$

Domain

$x \in \mathbb{R}$

Range

$y \in \mathbb{R}$

Y-Intercept (x=0)

$(0; -\frac{2}{3})$

X-Intercept (y=0)

$0 = \frac{x-2}{3}$

$0 = x - 2$

$2 = x$

$(2\ ;\ 0)$

TURNING POINT

None

ASYMPTOTES

None

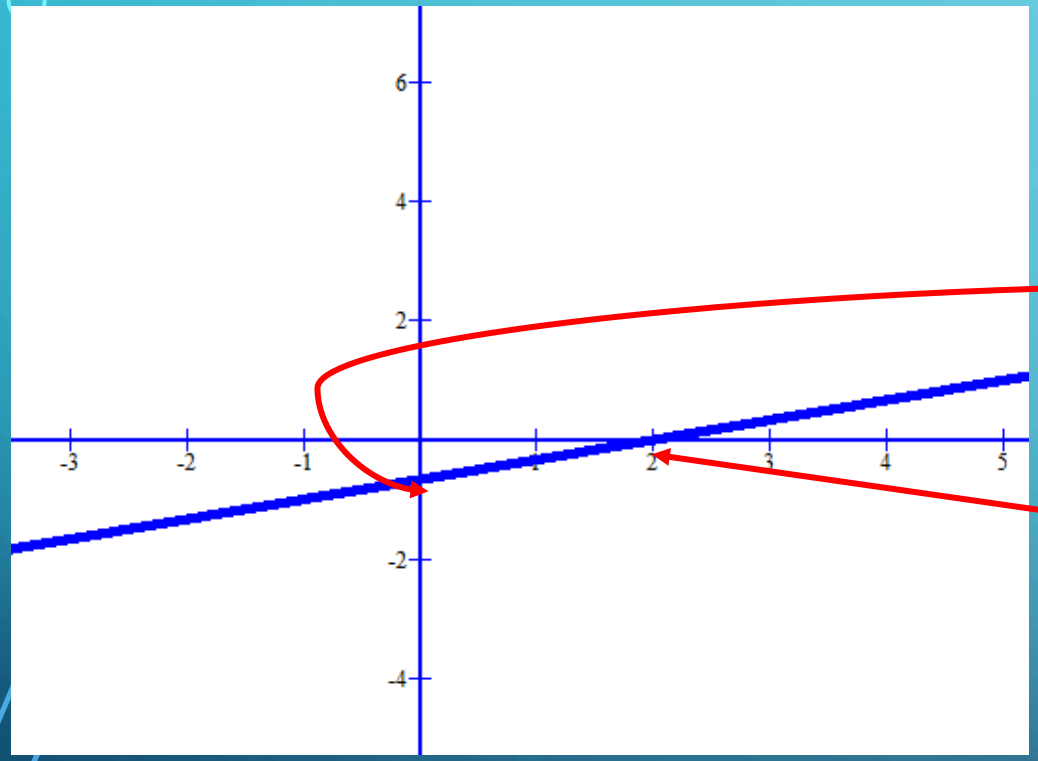
GRADIENT

$\frac{1}{3}$ (Positive)

INCREASING FUNCTION

As x-values get bigger, so do the y-values

LET US NOW LOOK AT THE INVERSE FUNCTION OF THE STRAIGHT LINE GRAPH



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$(0; -\frac{2}{3})$

X-Intercept (y=0)

$\mathbf{0} = \frac{x-2}{3}$

$0 = x - 2$

$2 = x$

$(2\ ;\ 0)$

TURNING POINT

None

ASYMPTOTES

None

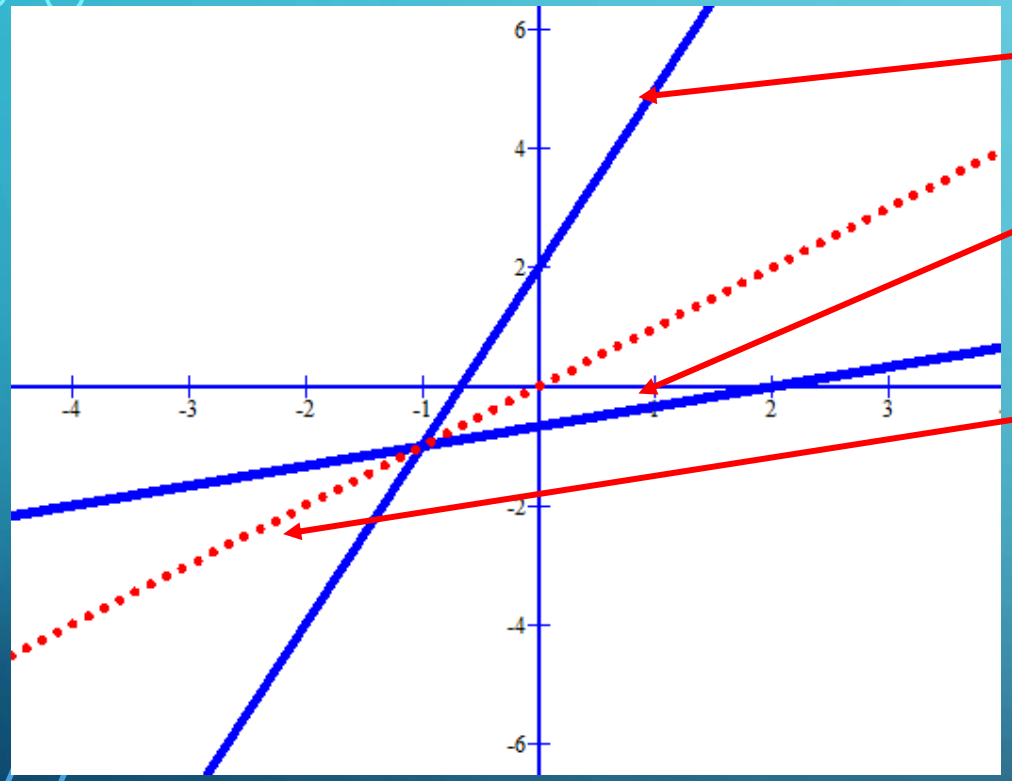
GRADIENT

$\frac{1}{3}$ (Positive)

INCREASING FUNCTION

As x-values get bigger, so do the y-values

COMPARE THE FUNCTION OF THE STRAIGHT LINE GRAPH TO THE INVERSE FUNCTION OF THE STRAIGHT LINE GRAPH



STRAIGHT LINE GRAPH

INVERSE STRAIGHT LINE GRAPH

Axis of Symmetry (y=x)